TO: G. Burke

FROM: A. Andujo

SUBJECT: ST-5 Preliminary Study

This study is in response to a request from the ST-5 mission. The purpose of this study is to evaluate the DSN's ability to support the ST-5 mission requirements.

Reference information was acquired using the FASTER (Forecasting and Scheduling Tool for Earth-based Resources) forecasting system, TIGRAS (TMOD Integrated Ground Resource Allocation System) scheduling tool and the updated mission set database from the February 2004 Resource Allocation Review Board (RARB). Other information used was acquired from Bob Shendock in the form of the events and user loading profile submitted May 26, 2004.

Summary of Results

This study was completed without entering the ST-5 loading in to the FASTER database as no usable viewperiods are yet available.

The requirements and trajectory of the ST-5 mission designate it as a Low Earth Orbiter; as such the mission is typically not supported by the DSN, except during launch, emergency and backup support periods. The Deep Space Network is geared primarily for the needs of the deep space and high Earth orbiting missions. The DSN is, and always will be capable of supporting all trajectory types, but due to the nature of the Low Earth Orbiting mission's short and more frequent viewperiods, the multiple supports may interfere in allowing a deep space mission from acquiring a large block of time. Particularly with ST-5 in that it is a multiple spacecraft mission possibly requiring simultaneous support from multiple antennas.

During launch weeks 11 - 23 of 2006 it is unlikely that the DSN would be able to fulfill the requirements requested. In week 09 and 10 of 2006, requested support would cause a tremendous burden on DSN resources and all other missions and would likely not be supportable by the DSN. This updated ULP illustrates a tremendous increase to requirements since the original ULP was submitted in 2002. (See Figures 1 and 2)

During the three months of the ST-5 mission we have identified several critical events that will most likely limit the DSN's ability to support ST-5. (See Figure 3)

Recommendations

It is our recommendation that the ST-5 mission use the DSN to supplement launch support, critical events and backup support as well as for periods when sites other than the DSN may have better access to the spacecraft than other networks.

Figure 1: ST-5 User loading Profile Submitted May 2004

9-Jun-04

User Loading Profiles

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Project Manager Date

Space Technology 5

VP			Durations	Calibration	January	February	March	April	May	June	July	August	September	October	November	December
Object	User	Resource	Ave Min	Pre Post	1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16 17	18 19 20 21	22 23 24 25 26	27 28 29 30 31	32 33 34 3	5 36 37 38 39 4	0 41 42 43	44 45 46 47 48	49 50 51 52 53
200	06															
SUN	ST5	34B1,34B2	0.4 0.4	1.00 0.25			24 42 42 42	42 42 42 42	42 42 42 42	42 42						
SUN	ST5 launch	DSS-66/54/55	0.6 0.6	3.00 0.25		2	2									
SUN	ST5 launch	DSS-46/34	0.2 0.2	3.00 0.25		1										
SUN	ST5 launch	DSS-16/26	0.7 0.7	1.00 0.25		(}									
SUN	ST5 launch	DSS-46/34	0.7 0.7	1.00 0.25		į										
SUN	ST5 phase A	34B1,34B2	0.7 0.7	1.00 0.25		36	3 45									
SUN	ST5 Phase B	34B1,34B2	0.7 0.7	1.00 0.25		12	15									

Figure 2: ST-5 User loading Profile Submitted 2002

9-Jun-04

User Loading Profiles

Concurrence:

Project Manager Date

Space Technology 5

VP			Duration	ns Ca	alibration	January	F	ebruary	March	April	Ma	ay	June	July	August	September	October	Novembe	r December
Object	User	Resource	Ave Mi	in Pr	e Post	1 2 3 4	5 6	7 8 9	10 11 12 1	3 14 15 16	17 18 19 2	20 21 22 2	23 24 25 26	27 28 29 30 31	I 32 33 34 35	5 36 37 38 39 4	40 41 42 43	44 45 46 47	48 49 50 51 52 53
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SUN	ST5	34B1,34B2	1.5 1	.5 1.	00 0.25									16 16 16 16	6 16 16 16 1	6 16 16 16 16 ⁻	16		
SUN	ST5 Phase A	DSS-24,25	1.5 1	.5 1.	00 0.25								3						
SUN	ST5 launch	DSS-46/34	7.0 7	7.0 3.	00 0.25								1						
SUN	ST5 launch	DSS-16/26	8.2 8	3.2 3.	00 0.25								1						
SUN	ST5 Phase A	DSS-46/34	1.5 1	.5 1.	00 0.25								2	5					
SUN	ST5 Phase A	DSS-16/25	1.5 1	.5 1.	00 0.25								8	11					
SUN	ST5 Phase B	DSS-16/25	1.0 1	.0 1.	00 0.25								6	6					
SUN	ST5 Phase B	DSS-46/34	1.0 1	.0 1.	00 0.25								2	2					

Figure 3: Major DSN Antenna Downtime Chart 2006



	January	February	March	April	May	June	July	August	September	October	November	December
Weeks	1 2 3 4	5 6 7 8	9 10 11 12 13	14 15 16 17	18 19 20 21	22 23 <mark>24</mark> 25 26	27 28 29 30	31 32 33 34 35	36 37 38 39	40 41 42 43	44 45 46 47 48	49 50 51 52
	ME	RO Approach/	TCM-3/MOI			MDO 0 lo loi		Bring	0-: / 0-	.1 0:		
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	INGM HOLI	JSC TCM-3		VC	R1 DTR Arra	y <mark>DA</mark> WN La	aun ah	SELENE <u>Lau</u> nc		MEX Sola	V Corono	PPING
Key	LIVIC	<u> </u>		[VC	VGD1 ASCA	L and MAGROL	aunich	SELENC CAUNC	n NE EOPM	INIEV 2015	ar Curuna	
	SDIL Farth F	l ?e-entry/TCM-	ı ·19/Recovery/TCI		VOINT ABOA		L /by Rehearsa			I -12 VGR1 D	J FR Array	
Events		I WMAI	P TCM			WMAP TCM	Dj Ronourou	Ϊ	VGR2 DTR F	P/B	VGR1 ASCAL a	nd MAGROL
	WIND TCM		Ahead Launch	WIND TCM		VGR2 MA	AGROL	VGR1 MAGROI		SCAL and MA		R2 MAGROL
			Behind Launch			_	MUSC TO			МАР ТСМ		_
				MSGR TCM-			WIND TOM		ROSE Mars	Swingby		
		SC	HO Keyhole		SC	HO Keyhole		SOHO) Keyhole		DSM2 SOHO) Keyhole
		VGR1 MAGE	ROL SOHO	HSO						WIND TCM		
									D24 X/X-Ka	Band		
GDSCC												
absec												
CDSCC												
CDSCC										D45 Ante	enna Controller	
										D45 AIRC	inia conaonei	
					D6	3 Antenna Con	troller					
MDCCC												
MDSCC	•											
Weeks	1 2 3 4	5 6 7 8	9 10 11 12 13	14 15 16 17	18 19 20 21	22 23 24 25 26	27 28 29 30	31 32 33 34 35	36 37 38 39	40 41 42 43	44 45 46 47 48	49 50 51 52

Revised: June 4, 2004

As always, the results of this study are subject to change, in that network loading changes as requirements for planned missions are input and updated and periods of antenna downtime are identified. We will continue to work with ST-5 and other users of the DSN to maximize the time available for each individual user.

cc:

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